Claims

1. *In vitro* method for analyzing a sample from a mammal in connection with cardiovascular diseases, wherein said method comprises the following steps:
   a) isolating of bone marrow-precursor-cells (BMP) and/or blood-derived circulating precursor-cells (BDP) by means of cell specific surface markers, and
   b) determining of the cardiovascular functionality of the isolated BMP and/or BDP by means of a suitable migration assay.

2. Method according to claim 1, further comprising the comparison of the result as obtained from the sample as examined with a reference value and/or the result of a reference sample.

3. Method according to claim 1 or 2, wherein the sample to be examined is derived from a human.

4. Method according to any of claims 1 to 3, wherein the sample to be examined is selected from the group consisting of bone marrow, peripheral blood or fractions thereof and cell culture-suspensions or fractions thereof.

5. Method according to claim 4, wherein a coagulation inhibitor, in particular Heparin or EDTA, is added to the peripheral blood.

6. Method according to claim 4, wherein the sample to be examined is obtained by means of punctuation from the bone marrow.

7. Method according to any of claims 1 to 6, wherein the isolating occurs by using density-gradient-centrifugation, cell specific surface markers, and/or immunological methods.

8. Method according to claim 7, wherein the isolating occurs by using FACS or immunomagnetic separation.

9. Method according to any of claims 1 to 8, wherein the cell specific surface marker for BMP is selected from CD34, CD45 and/or CD133, and for BDP is selected from VEGFR2, CD105, vWF and/or CD31.

10. Method according to any of claims 1 to 9, wherein the migration assay is performed in a Boyden-chamber or a modified Boyden-chamber.

11. Method according to any of claims 1 to 10, wherein the migration assay is performed by using SDF-1, VEGF, SDF-1 or PlGF or MCP-1.

12. Method according to any of claims 1 to 11, wherein the cardiovascular diseases are selected from the group consisting of stable and unstable angina, stable coronary heart disease, acute coronary syndrome, myocardial infarction, acute myocardial infarction, acute heart syndrome, coronary artery disease, chronic ischemic cardiomyopathy (ICMP), dilatative cardiomyopathy (DCM), heart insufficiency, or other causes of a cardiac weakness.

13. Method according to any of claims 1 to 12, wherein the method is performed immediately before a cell infusion into the mammal.

14. Method according to any of claims 1 to 13, wherein the examined isolated BMP and/or BDP are autologous and/or heterologous for the mammal.

15. Diagnostic kit, comprising means for performing the method according to any of claims 1 to 14, optionally together with additional components and/or excipients.

16. Use of the kit according to claim 15 for diagnosing and/or prognosing cardiovascular diseases, for monitoring of their therapies and/or for the determination of the cardiovascular functionality of BMPs or BDPs for a stratification for a prospective cell therapy with stem- and progenitor cells for increasing the perfusion of ischemic tissue or for the regeneration of tissue loss in particular in heart insufficiency, and/or for identifying of patients that would profit fro an *ex vivo* pretreatment of their BMPs or BDPs for an improvement of the cardiovascular functionality before retransplantation of the cells.

17. *In vitro* method for isolating specific bone marrow-precursor-cells (BMPs) and/or blood-derived circulating precursor-cells (BDPs), comprising:
a) taking of a sample from a donor-mammal,
b) isolating BMPs and/or BDPs from the sample so obtained, and
c) determining of the cardiovascular functionality of the isolated BMPs and/or BDPs by means of a suitable migration assay.

18. Method according to claim 17, wherein the sample to be examined is derived from a human.

19. Method according to claim 17 or 18, wherein the sample to be examined is selected from the group consisting of bone marrow, peripheral blood or fractions thereof and cell culture-suspensions or fractions thereof.

20. Method according to claim 19, wherein the sample to be examined is obtained by means of punctuation from the bone marrow.

21. Method according to any of claims 17 to 20, wherein the isolating occurs by means of density-gradient-centrifugation, cell specific surface markers, and/or immunological methods.

22. Method according to claim 21, wherein the isolating occurs by using FACS or immunomagnetic separation.

23. Method according to any of claims 17 to 22, wherein the cell specific surface marker for BMP is selected from CD34, CD45 and/or CD133, and for BDP is selected from VEGFR2, CD105, vWF and/or CD31.

24. Method according to any of claims 17 to 23, wherein the migration assay is performed in a Boyden-chamber or a modified Boyden-chamber.

25. Method according to any of claims 17 to 24, wherein the migration assay is performed by using SDF-1, VEGF, SDF-1 or PlGF or MCP-1.

26. Method according to any of claims 17 to 25, wherein the isolated BMP and/or BDP are further genetically modified, in particular in order to improve the cardiovascular functionality of the cells.

27. Specific bone marrow-precursor-cell (BMP) or blood-derived circulating precursor-cell (BDP), produced according to any of claims 17 to 26.

28. Specific bone marrow-precursor-cell (BMP) or blood-derived circulating precursor-cell (BDP) according to claim 27, wherein the isolated BMPs and/or isolated BDPs are autologous and/or heterologous for the mammal.

29. Method for producing a pharmaceutical composition, comprising the method according to any of claims 1 to 26 and furthermore formulating of said pharmaceutical composition by admixing with common pharmaceutically acceptable carries and/or diluents.

30. Method according to claim 29, wherein formulating furthermore comprises an admixing with statines, in particular atorvastatin, VEGF and/or erythropoietin.

31. Pharmaceutical composition, produced according to claim 29 or 30.

32. Use of a specific BMP and/or BDP according to claim 27 or 28 or a pharmaceutical composition according to claim 31 for the treatment of cardiovascular diseases, selected from the group consisting of stable and unstable angina, stable coronary heart disease, acute coronary syndrome, myocardial infarction, acute myocardial infarction, acute heart syndrome, coronary artery disease, chronic ischemic cardiomyopathy (ICMP), dilatative cardiomyopathy (DCM), heart insufficiency, or other causes of a cardiac weakness.

33. Use according to claim 32, wherein the treatment comprises the infusion of cells into the mammal.

34. Use according to claim 32, wherein the treatment furthermore comprises the administration of statines, in particular atorvastatin, VEGF, and/or erythropoietin.